Current Approver:	n/a	Copy To on Completion:	n/a
Current Status:	Issued	Next Status:	n/a
Approval Required From:	All		

Burnside Incident Investigation Report
(for Internal Use Only)

Created by Thomas Miller On 02/12/2013

Preliminary Incident Information

Incident Information (Link to S3Y)			
Incident Number:	13-0005-RCI		
Incident:	Actual		
Title:	Converter Gas Leak		
Incident Date: (if applicable)	02/10/2013	Incident Time:	08:30 AM
Date of first awareness / Initial DuPont contact /notified of Incident:	02/10/2013	Time of first awareness / initial DuPont contact / notified of Incident:	08:30 AM
Date Investigation Began:	02/11/2013	Time Investigation Began	07:00 AM
Business/Unit:	Burnside	Area:	Acid Plant
Brief Description of known facts:	At approximately 8:30 AM a leak developed on the converter first pass transition piece.		
Immediate Action Taken:	KBR employee's that were called to the site removed a section of 6" cpvc pipe that had failed and replaced it with 6" corrugated stainless steel hose. Additional sheet metal was added to the "gas collection box" to aid in capturing the gas leak. Leak was contained, but another leak resulted on the morning of 2/12 when a vacuum hose cracked and split. Plant rate was cut to minimum and KBR mechanics again responded. Broken hose was reattached and leak was contained. Plant remained at low rates until shutdown to make repair began on 2/13. Temporary repair made on 2/13. Scope being developed for significant repair work in October shutdown.		
Type of Incident: (Select all that apply)	☐ Driving - Vehicle ☒ Environmental ☐ Off-Job Injury ☐ Electrical ☐ Fire ☒ Process Safety ☐ Environmental Deviation ☐ Occupational Health ☐ Workplace Safety		
Incident Function Area			
Was this a High Potential Near Miss (A HPNM has the potential to cause fatality or serious injury - Link to serious injury definition)			
Was a High Risk Activity (HRA) involved?			
Was there Potential for an On-Job Injury / Illness	No		
Was there an On-Job Injury / Illness (Link to S35G)	No		
Operation status at time of incident	Normal Operation / Activity		
Incident Recommendation - PREFIX:	INPS - Incident - Process Safety		
Environmental and / or Process Safety			
Type of Environmental / Process Incident (Select all that apply)	Release of Materials		
Area PSM Classification	HHP		
Was there off-site impact?	No		
Outside Notification Required?	No Release Reporting Guidelines	Names of Outside Agencies Notified	
Release - UNITS of Weight Measure:	Lbs		

EXHIBIT # 2
DEPONENT Monholen
TORRES REPORTING & ASSOCIATES, INC
COURT REPORTING & LITIGATION SERVICES
www.torresreporting.com

Amount Released out of Primary containment		Duration (Mins.)	
Was release contained?	Partially Contained		
Amount Released out of Secondary Containment (Decimal Symbol to be ".")		To what medium?	Air
HTM Chemicals Released (Select All That Apply)		NONE	
Chemicals Released (other than HTM)		Sulfur dioxide (gas) and sulfur trioxide (gas)	
Were any people exposed to the chemicals?		No	

Additional Site Specific Information Needed / Instructions

Instructions

2009 ACC Reportable Quantities:

An acute release of flammable, combustible, or toxic chemical from primary containment. Release measured in 1-hr blocks.

Hydrogen Sulfide	55 lbs
Sulfur dioxide	220 lbs
Sulfur trioxide, stabilized	55 lbs
Sulfuric Acid, fuming (≥30% oleum)	55 lbs
Sulfuric Acid, fuming (<30% oleum)	1100 lbs
Sulfuric Acid	2200 lbs
Sodium Hydroxide solution (all strengths):	2200 lbs
Nitrosylsulfuric acid	2200 lbs
Hydrogen Peroxide (>40% - <60%)	2200 lbs

Incident Report Quality Assurance questions.
These questions are to be reviewed and anwered for each incident that is being authorized.

: Incident Quality Assurance Questionaire.doc

PHA Area	Acid Plant

Incident Severity Ratings / Investigation Requirements

Environment

ENVIRONMENT RATING (* Indicates an automatic Category A Incident)		Points	
1. Hazards and materials involved	i. Materials having significant adverse effect potential		10
2. Actual Size of release, incident or magnitude of event	b. Moderate - Release >23 to 450 kg (>50 to 1,000 lb). For explosions, vented deflagration resulting in release to safe outdoor location		10
6. Actual on-site Impact			0
6(1). Evacuation - Due to the presence of hazardous conditions	c. Precautionary evacuation or no evacuation	0	
6(2). Shelter-in-place - Due to the presence of hazardous conditions	c. Precautionary shelter-in-place or no shelter-in-place	0	
6(4). Process shutdown - Due to the presence of hazardous conditions as a result of the incident	d. Nonemergency shutdown due to very small drips or puffs that are localized at the source only and where very minimal or no production impact occurs. Note - Discretionary / nonemergency shutdowns that are taken consistent with a site's zero-leak philosophy should be scored 0 points	0	

6(6). Damage to property (e.g. - groundwater / sediment / surface water / soil / or soil cover ([e.g. - aggregate and shell]) contamination)	c. No impact to soil / surface water / or groundwater or release limited to surface soil or water that is readily remediated by plant personnel as part of the initial response to the incident	0	
6(7). Damage to wildlife (e.g. - deer / birds / or small animals) - aquatic life (e.g. fish / turtles / crags / or frogs) - or vegetation (e.g. trees / bushes / or grass)	c. No impact or slight reversible impact to vegetation (e.g. brown grass or damage to tree leaves) aquatic life or wildlife in the area of the event only	0	
8. Actual off-site impact			0
8(1). Evacuation	c. No evacuation	0	
8(2). Shelter-in-place	c. No precautionary or nonprecautionary shelter-in-place	0	
8(3). Injury	b. None	0	
8(4). Media Coverage	d. None	0	
8(5). Damage to property (e.g. - groundwater / sediment / surface water / soil / or soil cover ([e.g. - aggregate and shell]) contamination)	c. None	0	
8(6). Damage to wildlife (e.g. - deer / birds / or small animals) - aquatic life (e.g. fish / turtles / crags / or frogs) - or vegetation (e.g. trees / bushes / or grass)	c. None	0	
8(7). Community Impact	d. None	0	
8(8). Outside agency emergency response	b. No notification - involvement - or outside agency responders notified and on standby or observing with no active involvement in emergency response	0	
8(9). Government and external reporting	c. Precautionary, courtesy, or no reporting	0	
8(10). Government response	c. None	0	
			20
Environment Rating: C			

Process

PROCESS RATING (* Indicates an automatic Category A Incident)		Points	
1. Hazards and materials involved	i. Materials having significant adverse effect potential		10
2. Actual Size of release, incident or magnitude of event	c. Moderate - Release >23 to 450 kg (>50 to 1,000 lb). For explosions, vented deflagration resulting in release to safe outdoor location		10
3. Potential or severity	c. Small - Potential release ,2,300 kg (,5,000 lb)		5
4. Degree of control site had during the incident	b. Event was partially in control		10
5. Involvement of line-of-defense safety layers of protection	c. Line of defense or procedural controls compromised even with no release (near miss)		10
6. Actual on-site Impact			0
6(1). Evacuation - Due to the presence of hazardous conditions	c. Precautionary evacuation or no evacuation	0	
6(2). Shelter-in-place - Due to the presence of hazardous conditions	c. Precautionary shelter-in-place or no shelter-in-place	0	
6(3). Emergency response - Due to the presence of hazardous conditions	c. Local area personnel able to mitigate the events only in the area of the release or fire. On-site emergency responders were not activated or activities were limited to observation / managing traffic / or post release mitigation (e.g. cleanup)	0	
6(4). Process shutdown - Due to the presence of hazardous conditions as a result of the incident	d. Nonemergency shutdown due to very small drips or puffs that are localized at the source only and where very minimal or no production impact occurs. Note - Discretionary / nonemergency shutdowns that are taken consistent with a site's zero-leak philosophy should be scored 0 points	0	
6(5). Injury	d. None	0	
7. Potential on-site impact of actual event	d. No recordable injury potential - no potential disruption to operations		0
8. Actual off-site impact			0

8(1). Evacuation	c. No evacuation	0	
8(2). Shelter-in-place	c. No precautionary or nonprecautionary shelter-in-place	0	
8(3). Injury	b. None	0	
8(4). Media Coverage	d. None	0	
8(5). Damage to property (e.g. - groundwater / sediment / surface water / soil / or soil cover ([e.g. - aggregate and shell]) contamination)	c. None	0	
8(6). Damage to wildlife (e.g. - deer / birds / or small animals) - aquatic life (e.g. fish / turtles / crags / or frogs) - or vegetation (e.g. trees / bushes / or grass)	c. None	0	
8(7). Community impact	d. None	0	
8(8). Outside agency emergency response	b. No notification - Involvement - or outside agency responders notified and on standby or observing with no active involvement in emergency response	0	
8(9). Government and external reporting	c. Precautionary, courtesy, or no reporting	0	
8(10). Government response	c. None	0	
9. Potential off-site impact of actual event	c. Low-potential for minimal off-site impact		5
10. Actual monetary loss in property damage, environmental damage, business interruption, and other costs associated with the incident	f. Very Low < $25M		0
			50
Process Rating: N/A			

Incident Type	Rating (A, B, C) (Link to S8Y)	Rating Number
Environmental	C	20
Process Safety	N/A	50

POTENTIAL ON-JOB INJURY	
POTENTIAL On-Job Injury / Illness	No

Determination of Investigation Requirements	
Is this a repeat incident?	No
Do you expect that Mechanical Integrity (MI) and/or Quality Assurance (QA) will be significant key factors or contributors to this incident?	○ Yes ● No
Is Further / Full Investigation of this incident recommended / required ? Reporting \ Roll-Up details are required for all incidents	No

"One-Pager" Communication	
Is a "One-Pager" to be prepared?	No
Preliminary One-Pager Suggested: All Event Related Injuries All Category A, B Incidents Near Miss Incidents (>LWC) Other type with important learnings	Final One-Pager Suggested: All Event Related LWC All Category A, B Incidents Other type with important additional learnings

MitC - INC (Incident Notification Communication) / ITS Transfer Status	

Transfer enabled By:	Thomas Miller/CL/DuPont On : 02/18/2013

Reporting / Roll-up Details

Environmental and / or Process Safety				
Primary equipment involved			Process Equipment (Reactors / Mixers / Extruders / Etc.)	
Units of material released quantity			Lbs	
Material Type	Name of Chemical / Material	Amount Released out of Primary containment	Amount Released out of Secondary Containment	Released out of Secondary Containment to:
Gases - toxic	Sulfur dioxide and sulfur trioxide	404	404	Air

PSM Incident Cost Calculator	
Property Damage cost ($)	$0
Environmental Damage cost ($)	$0
Business Interruption cost ($)	$0
Other Cost ($)	$0
Total Cost ($)	$0

Technology		
Process Hazards Analysis	☐ System	☐ Performance
Operating Procedures/Practices/SOC's	☐ System	☐ Performance
Process Technology	☐ System	☐ Performance
Electrical Technology	☐ System	☐ Performance
Facilities		
Pre-Startup Safety Reviews	☐ System	☐ Performance
Mechanical Integrity	☐ System	☐ Performance
Quality Assurance	☐ System	☐ Performance
Management of Change-Facilities	☐ System	☐ Performance
Personnel		
Auditing	☐ System	☐ Performance
Training	☐ System	☐ Performance
Contractor Safety	☐ System	☐ Performance
Emergency Planning/Response	☐ System	☐ Performance
Incident Investigation/Communication	☐ System	☐ Performance
Management of Change-Personnel (MOC - P)	☐ System	☐ Performance
Organizational Factors		
Leadership Focus	☐ System	☐ Performance
Employee Involvement	☐ System	☐ Performance
Practice consistent with procedures	☐ System	☐ Performance
Excellent Housekeeping	☐ System	☐ Performance
Individual & "Others Keeper" Factors		
Knowledge	☐ System	☐ Performance

Committment	☐ System	☐ Performance
Awareness	☐ System	☐ Performance

Attachments

Leak Calc 2-12-13.xlsx

Recommendations

Associated CAR's

Status	Goal Date	Assigned To	Action Required/Description

Mail Distribution

Workflow / Status / Edit History

Sulfur Furnace		
1st Pass Exit		
2nd Pass Exit	YES	
3rd Pass Exit	NO	
4th Pass Inlet D/A		
4th Pass Exit D/A		
4th Pass Exit S/A		
FAT Exit D/A		
FAT Exit S/A		

M.W.		1st Pass E	2nd Pass E	3rd Pass E	pass exit D	pass exit S	pass Inlet	FAT Exit D/	FAT Exit S/	Sulfur Furnace	Manual Entr
28.0134	N2	81.95%	82.90%	83.11%	83.25%	83.22%	92.49%	93.03%	92.91%	79.10%	0.00%
31.9988	O2	7.68%	6.62%	6.38%	6.22%	6.25%	7.10%	6.95%	6.98%	10.90%	0.00%
64.0648	SO2	3.13%	0.87%	0.37%	0.02%	0.11%	0.41%	0.02%	0.11%	10.00%	0.00%
80.0642	SO3	7.23%	9.61%	10.14%	10.51%	10.42%	0.00%	0.00%	0.00%	0.00%	0.00%
		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.00%
	MW	33.21	33.59	33.68	33.74	33.72	28.44	28.30	28.33	32.05	0.00
	density, lb_m/ft^3	0.0369	0.0374	0.0375	0.0375	0.0375	0.0318	0.0315	0.0315	0.0357	0.0000
		69.8% conver	7% conver	9% conver	00 ppm SO	150 ppm SO	5% conver	50 ppm SO	250 ppm SO	10% SO_2	

pressure	118	inH_2O
	4.2598	psi
Temperature	1567.67	R
Calculated Gas Density	0.0369	lb_m/ft^3
Molecular Weight, M_w	33.21	
Mach number, M	0.537	Unchoked Flow
Discharge coefficient, C_o	0.82	standard value for P_t/P_o close to 1
	1.0	conservative value

SULFUR PLANT

USE TYPICAL GAS COMPOSITION?

YES

CHOOSE BEST DESCRIPTION OF GAS SOURCE

Gas Source: 1st/Pass Ext.
99.8% conversion

	mole %
N_2	81.86%
O_2	7.68%
SO_2	3.13%
SO_3	7.23%
Total	100.0%

ENTER THE k VALUE FROM THE k TAB BELOW

heat capacity ratio, k: 1.28

ENTER THE FOLLOWING LEAK DATA

Gas Temperature	609	°C
Source Pressure	118	in H_2O, gauge
Outside Pressure	14.7	psia (for leak to standard atmosphere use 14.7)
Leak Area	1.125	in^2

SO2 lbs/hr	10	
SO3 lbs/hr	30	
Total SO2 Release	104	10 hour release
Total SO3 Release	300	10 hour release

RESULTS

STANDARD: $C_d = 0.62$

Total Leak Rate:	0.552 lb/min
SO_2 Leak Rate:	0.577 lb/min
SO_3 Leak Rate:	1.665 lb/min